

THE *CERACANTHIA* COMPLEX (LEPIDOPTERA: PYRALIDAE:  
PHYCITINAE) IN COSTA RICA. I. *CERACANTHIA* RAGONOT

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*Abstract.*—The mostly Neotropical *Ceracanthia* complex (*Ceracanthia* Ragonot, *Megarathria* Ragonot, *Drescoma* Dyar, *Lascelina* Heinrich) is defined. The genus *Ceracanthia* is redescribed and *Drescomopsis* Dyar is **newly synonymized** with *Ceracanthia*. Ten species of *Ceracanthia* are recognized in Costa Rica, five of which are described as new: *Ceracanthia alturasiana*, *Ceracanthia cornuta*, *Ceracanthia eugenieae*, *Ceracanthia pseudopeterseni*, and *Ceracanthia squamimagna*. Three of the remaining species are transferred from *Megarathria* and given the **new combinations**: *Ceracanthia frustrator* (Heinrich), *Ceracanthia schausi* (Heinrich), and *Ceracanthia squamifera* (Heinrich), and one species is referred from *Drescomopsis* to form the **new combination** *Ceracanthia soraella* (Druce). Keys are provided to separate the genera belonging to the *Ceracanthia* complex and for males of the species belonging to *Ceracanthia*. Habitus photographs of male adults, and line drawings of male antennae and male genitalia, of all species are included. Also figured are the female genitalia of six of the ten species and the costal scale cluster or scale ridge of the forewings of *Ceracanthia soraella* and *Ceracanthia frustrator*.

*Key Words:* Phycitinae, taxonomy, Neotropical

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The subfamily Phycitinae is the largest of the five subfamilies currently in the Pyralidae. Many included species are morphologically hyperdiverse, particularly with regard to the male antennae and male genitalia. Recent extensive collecting of phycitines, particularly by personnel at the Instituto Nacional de Biodiversidad (IN-Bio), Santo Domingo, Costa Rica, has prompted an in-depth study of the Phycitinae in Costa Rica. One group belonging to the subfamily that has been frequently collected belongs to a complex consisting of the genera *Ceracanthia* Ragonot, *Megarathria* Ragonot, *Drescoma* Dyar, and *Las-*

*celina* Heinrich. The characteristic forewing, of most species of the complex, is mainly pale on its anterior (costal) half and chiefly dark on its posterior (inner) half (Figs. 2–9). Many have the male antenna with a basal sinus bearing an upper and lower spine or protuberance (Figs. 11–20). All have the eighth abdominal sternite of the male developed as a digitate pocket. The male genitalia have a strong fusion of the gnathos and scaphium, large, broad valvae, and usually a long vinculum. Almost all have very obvious, long setal tufts extending from the base of the sacculus (Figs. 21, 23, 25, 27, 29, 31, 33, 37, 39). The fe-

male genitalia are simple; the only feature of any significance is a signum in the corpus bursae that consists of a scobinate, partly-sclerotized patch with, or without, a small, to large spine (Figs. 43–48).

Unaware that such a complex of many similar appearing species existed, early lepidopterists, Zeller (1881), Ragonot (1893), and Druce (1899), who in their studies of South American and Mexican species relied chiefly on forewing habitus, grouped species together and recognized only three. Later, Dyar (1914, 1919) named a few additional species from Cuba and Central America. Heinrich, in 1956, was the first to include genitalia in his study and thereby provided a more accurate, expanded account of the group, particularly in Costa Rica. Neunzig and Dow (1993) reviewed the species occurring in Belize, and Neunzig described species from Mexico (1994) and the Dominican Republic (1996).

This paper provides more information on the genus *Ceracanthia* in Costa Rica. A subsequent contribution (*Ceracanthia* complex. II) will cover species in Costa Rica that belong to the other three genera. Most of the specimens studied were borrowed from the collection of INBio. Additional Costa Rican material has been seen that has recently accumulated in the National Museum of Natural History (USNM), Smithsonian Institution, Washington, DC, U.S.A., the Essig Museum, University of California (UCB), Berkeley, CA, U.S.A., and in the collection of Vitor O. Becker (VOB) Brasilia, Brazil.

All types of previously described species belonging to the complex were examined, including those of *Megarhria* (*Myelois*) *peterseni* (Zeller) and *Ceracanthia* (*Homoeosoma*) *soraella* (Druce) in The Natural History Museum (BMNH) London, England. Holotypes of new species have been deposited in the insect collections of INBio and UCB. Paratypes can be found at INBio, USNM, UCB, in the collection of VOB and at North Carolina State University (NCSU) Raleigh, NC, U.S.A.

It has not been possible to associate females with males with all species because of striking similarities in color and maculation of most species in the complex. Therefore, caution needs to be exercised using females in the key to genera, and in referring to the descriptions of genera.

The appearance of the immature stages of all species belonging to the complex in Costa Rica remain unknown. Heinrich (1956) included *Maytenus phyllanthoides* Bentham (Celastraceae) as the host of a North American species in the genus *Lascalina*.

#### KEY TO GENERA OF THE *CERACANTHIA* COMPLEX

1. Scape of male antenna broad (about 3× as wide as width of base of shaft); shaft of male antenna with basal sinus, but distal part of sinus simple, without mesially protruding spine or other element; male genitalia with gnathos having a very weakly developed, highly sclerotized, tubular apical element, a sacculus with more than two kinds of scale tufts attached to its base (most scales strongly coiled), and a distinctly broad vinculum (disproportionately so, particularly relative to size of uncus); female genitalia with ductus bursae long and distinctly twisted (about 2× as long as corpus bursae) . . . . . *Megarhria* Ragonot
- Scape of male antenna more slender (cylindrical) (Figs. 11–20); shaft of male antenna with or without basal sinus (if sinus is present, a spine or protuberance usually occurs at the distal end of the sinus) (Figs. 11–20); male genitalia with apex of gnathos formed into well developed, sclerotized, slender element (Figs. 21, 23, 25, 27, 29, 31, 33, 35, 37, 39) or without rodlike grasping element, a sacculus with one or two kind(s) of scale tufts attached to its base (all scales straight to slightly curved), and vinculum not overly broad relative to rest of genitalia; female genitalia (Figs. 43–48) with ductus bursae shorter than, or about same length as, corpus bursae . . . . . 2
2. Apical part of gnathos developed into a hook or rod, only partially fused to scaphium (Figs. 21, 23, 25, 27, 29, 31, 33, 35, 37, 39); aedoeagus without basal supplemental appendage (Figs. 22, 24, 26, 28, 30, 32, 34, 36, 38, 40); scobinate patch of signum of corpus bursae simple (Figs. 44–47), or with small, short spine (Fig. 43) or with large, mostly laterally oriented, hooked spine (Fig. 48) . . . . . 3

- Apical part of gnathos not developed into a slender rodlike element or hook (gnathos completely fused to wall of scaphium); aedeagus with supplemental, basal appendage; scobinate patch of corpus bursae with large, mostly anteriorly oriented, hooked spine . . . . . *Lascelina* Heinrich
- 3. Base of shaft of male antenna simple; hindwing with distinct notch in costa, just beyond base; transtilla present, in form of a "U" (central part straplike); valva with uniformly tapered, pointed projection near apex of sacculus; scobinate patch of corpus bursae with large, hooked spine (length of spine equal to about 1/2 width of corpus bursae) . . . . . *Drescoma* Dyar
- Base of shaft of male antenna with shallow to deep sinus, and usually a pair of spines (in some species scale tuft also present) (Figs. 11-20); hindwing without notched costa; transtilla usually absent; clasperlike projection near apex of sacculus usually distinctly swollen (Figs. 21, 23, 27, 29, 31, 33, 35, 37); scobinate patch of signum of corpus bursae simple (Figs. 44-47), or with small short spine (Fig. 43), or with large, hooked spine (length of spine equal to about 1/2 width of corpus bursae) (Fig. 48) . . . . . *Ceracanthia* Ragonot

*Ceracanthia* Ragonot

*Ceracanthia* Ragonot 1893:230. Type species: *Ceracanthia vepreculella* Ragonot 1893. Monotypy

*Procandiope* Dyar 1919:50. Type species: *Procandiope mamella* Dyar 1919. Monotypy

*Drescomopsis* Dyar 1919:61. **New synonymy.** Type species: *Drescomopsis subelisa* Dyar 1919. Original designation. *Drescomopsis subelisa* is considered to be a junior synonym of *Homoeosoma soraella* Druce 1899.

Note.—We have synonymized *Drescomopsis* with *Ceracanthia* because the type species of the two genera have similar male antennae and similar genitalia. Heinrich (1956) kept *subelisa* in Dyar's *Drescomopsis* because of a reduced number of veins in the hindwing of *subelisa*, a feature that we consider to be of minor taxonomic significance.

Description.—Male antenna with scape cylindrical, slightly swollen apically; shaft

usually with distinct sinus at base (sinus shallow in *pseudopeterseni* and *soraella*); basal and distal end of sinus usually with spine, or protuberance; inner surface usually covered with appressed scales (*mamella*, *pseudopeterseni* and *soraella* with erect papillae); sinus with or without brush or tuft of scales attached to posterior base of sinus; sensilla trichodea (cilia) of antenna about 1/2 as long as width of shaft at mid-sinus. Antenna of female simple. Labial palpus of male upturned, reaching above vertex; 3<sup>rd</sup> segment about as long as 2<sup>nd</sup> segment (about 1/2 as long as 2<sup>nd</sup> segment on *squamimagna*). Maxillary palpus of both sexes small, short scaled. Haustellum well developed. Ocelli present. Forewing of male simple, or with raised costal scale cluster or scale ridge (*soraella*, *frustrator*), or with slight costal concavity or fold (*pseudopeterseni*, *squamimagna*), underside simple or with subcostal streak of contrastingly-colored scales. Forewing of both sexes smooth, with 11 veins; R<sub>3+4</sub> and R<sub>5</sub> stalked for about 1/2, or slightly over 1/2, their lengths; M<sub>1</sub> straight to slightly bowed; M<sub>2</sub> and M<sub>3</sub> separate or connate at base; CuA<sub>1</sub> from lower angle of cell; CuA<sub>2</sub> arising from well before lower angle of cell. Hindwing with seven to eight veins (1A, 2A, and 3A treated as one vein); Sc + R<sub>1</sub> and R<sub>s</sub> fused for less than 1/2 their lengths beyond cell; M<sub>1</sub> straight to slightly curved; M<sub>2</sub> and M<sub>3</sub> usually fused for less than 1/2 their lengths (M<sub>2</sub> and M<sub>3</sub> completely fused in *soraella*); CuA<sub>1</sub> briefly fused with stalk of M<sub>2</sub> and M<sub>3</sub> (or fused to single vein M<sub>2</sub> + M<sub>3</sub>); CuA<sub>2</sub> from before, but near lower angle of cell or from lower angle of cell; cell slightly more, to slightly less, than 1/3 length of wing. Male abdominal segment with one, or more, pair(s) of scale tufts originating from within a pocket of 8<sup>th</sup> abdominal sternite (pocket present in *mamella*, but without scale tufts); scales forming tufts simple, sometimes slightly broadened distally, not overly long, curved somewhat medially. Male genitalia with uncus broadly rounded apically; gnathos with apical part developed into hook

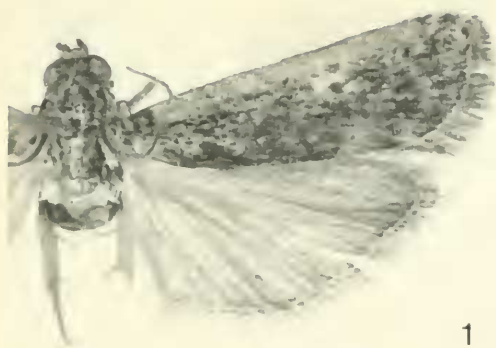
or rod (center part of hook or rod weakly formed, fused with scaphium); transtilla usually absent (present in *soraella*, *cornuta*, *schausi*, *eugenieae*, *alturasiana*); juxta a plate with short, setiferous, lateral arms; valva broad, covered on inner surface of distal half with broadened, spinelike setae (basal half with usual setae); outer surface of valva of most species with long, black, weakly attached scales that curl under usually obscuring some features of inner part of valva; sacculus with apex usually distinctly swollen, not pointed; base of sacculus with large (primary) and, usually, small (secondary) tuft of scales (*eugenieae* without tufts); aedeagus slender to somewhat robust; vesica usually with two groups of microspines or with larger spines (*mamella* with just one group of microspines and *alturasiana* with group of microspines and group of medium-sized spines). Female genitalia with ductus bursae shorter than corpus bursae; corpus bursae with signum; signum usually consisting of patch of scobinations with inner members forming patch more strongly developed and situated on an invaginated, teardrop-shaped, highly sclerotized plate (*pseudopeterseni*, *soraella*, *squamifera*, *squamimagna*) (signum in *mamella* similar, but one scobination developed into a small short spine and plate rectangular; *alturasiana* with large, curved, pointed hook associated with patch of scobinations); ductus seminalis attached to corpus bursae near junction of ductus bursae and corpus bursae.

KEY TO SPECIES OF MALE *CERACANTHIA*

(A key including females is not possible because the sexes of some species cannot be associated with certainty at this time.)

- 1. Forewing mostly pale on anterior half and dark on posterior half, with dark bands extending diagonally from about 1/3 out on costa, and from apex of wing, to dark posterior half, dividing most of pale costal area into three mainly white patches (most distal white patch small and indistinct in most species) (Figs. 2-9) . . . . . 3
- Forewing not as above (Figs. 1, 10) . . . . . 2

- 2. Forewing dull, yellowish ochre along costa; postmedial line of forewing indistinct (Fig. 1); antenna with inner surface of sinus covered with erect papillae, and without brush of scales attached to posterior base of sinus . . . . . *mamella* (Dyar)
- Forewing mostly dark along costa; postmedial line of forewing distinct (Fig. 10); antenna with inner surface of sinus covered with appressed scales and with small, short brush of scales attached to posterior base of sinus . . . . . *alturasiana* Neunzig and Solis, n.sp.
- 3. Forewing with long group of protruding scales extending over 1/2 length of costa (Figs. 4, 42) . . . . . *frustrator* (Heinrich)
- Forewing without long group of protruding scales extending over 1/2 length of costa . . . . . 4
- 4. Forewing with small raised scale cluster at base of costa (Figs. 3, 41); hindwing with M<sub>2</sub> and M<sub>3</sub> completely fused . . . . . *soraella* (Druce)
- Forewing without small raised scale cluster at base of costa; hindwing with M<sub>2</sub> and M<sub>3</sub> only partially fused . . . . . 5
- 5. Antenna with inner surface of sinus covered with erect papillae (Fig. 13) . . . . . *pseudopeterseni* Neunzig and Solis, n.sp.
- Antenna with inner surface of sinus covered with appressed scales . . . . . 6
- 6. Antenna with distal end of sinus strongly produced mesially into a smoothly-scaled, conical, hooked element (Fig. 20) . . . . . *cornuta* Neunzig and Solis, n.sp.
- Antenna with distal end of sinus not strongly produced into a smoothly-scaled, conical, hooked element . . . . . 7
- 7. Antenna with large tuft of scales attached to posterior base of sinus (tuft extends well beyond sinus; some scales forming tuft obovate) (Fig. 15) . . . . . *squamimagna* Neunzig and Solis, n.sp.
- Antenna with tuft of scales attached to posterior base of sinus smaller (tuft does not extend beyond sinus, or only slightly beyond sinus) (Figs. 16-18) . . . . . 8
- 8. Genitalia with inner basal lobe of valva strongly projecting mesially (lobe from each valva touching, or almost touching, each other); and with well developed transtilla (Figs. 35, 37) . . . . . 9
- Genitalia with inner basal lobe of valva weakly developed, and without transtilla (Fig. 31) . . . . . *squamifera* (Heinrich)
- 9. Genitalia without scale tuft on sacculus, and with vinculum narrow (Fig. 35) . . . . . *eugenieae* Neunzig and Solis, n.sp.
- Genitalia with well developed scale tuft on sacculus and with vinculum broad (Fig. 37) . . . . . *schausi* (Heinrich)



1



2



3



4



5



6

Figs. 1-6. Male. 1, *Ceracanthia mamella*. 2, *C. pseudopeterseni*, holotype. 3, *C. soraella*. 4, *C. frustrator*. 5, *C. squamifera*. 6, *C. squamimagna*, holotype.

*Ceracanthia mamella* (Dyar)

(Figs. 1, 11, 21-22, 43)

*Procandiopa mamella* Dyar 1919:51.

*Ceracanthia mamella* can be recognized by the appearance of the forewing (Fig. 1). A broad, dull, yellowish ochre costal band extends the length of the forewing. The rest

of the forewing is mostly a mixture of pale brown, red and black scales (appearing purple without magnification). The antemedial line is very weakly formed, and the post-medial line only slightly more apparent.

The male antenna (Fig. 11) has a well developed sinus in the base of the shaft, with a strong, mesially directed spine near



7



8



9



10

Figs. 7–10. Male. 7, *Ceracanthia cornuta*, holotype. 8, *C. schausi*. 9, *C. eugeniae*, holotype. 10, *C. alturasiana*, holotype.

its base and another at its distal end. The inner surface of the sinus is covered with erect papillae (a feature found only in a few other *Ceracanthia* (*pseudopeterseni*, *soraella*)).

The male genitalia (Figs. 21–22) have the costa of the distal half of the valva with a slightly inwardly produced distension, and the primary tuft of the sacculus distinctly longer than the length of the valva. The female genitalia (Fig. 43) possess a scobinate, sclerotized, rectangular patch, bearing a short spine, in the corpus bursae. The ductus bursae is shorter than the corpus bursae.

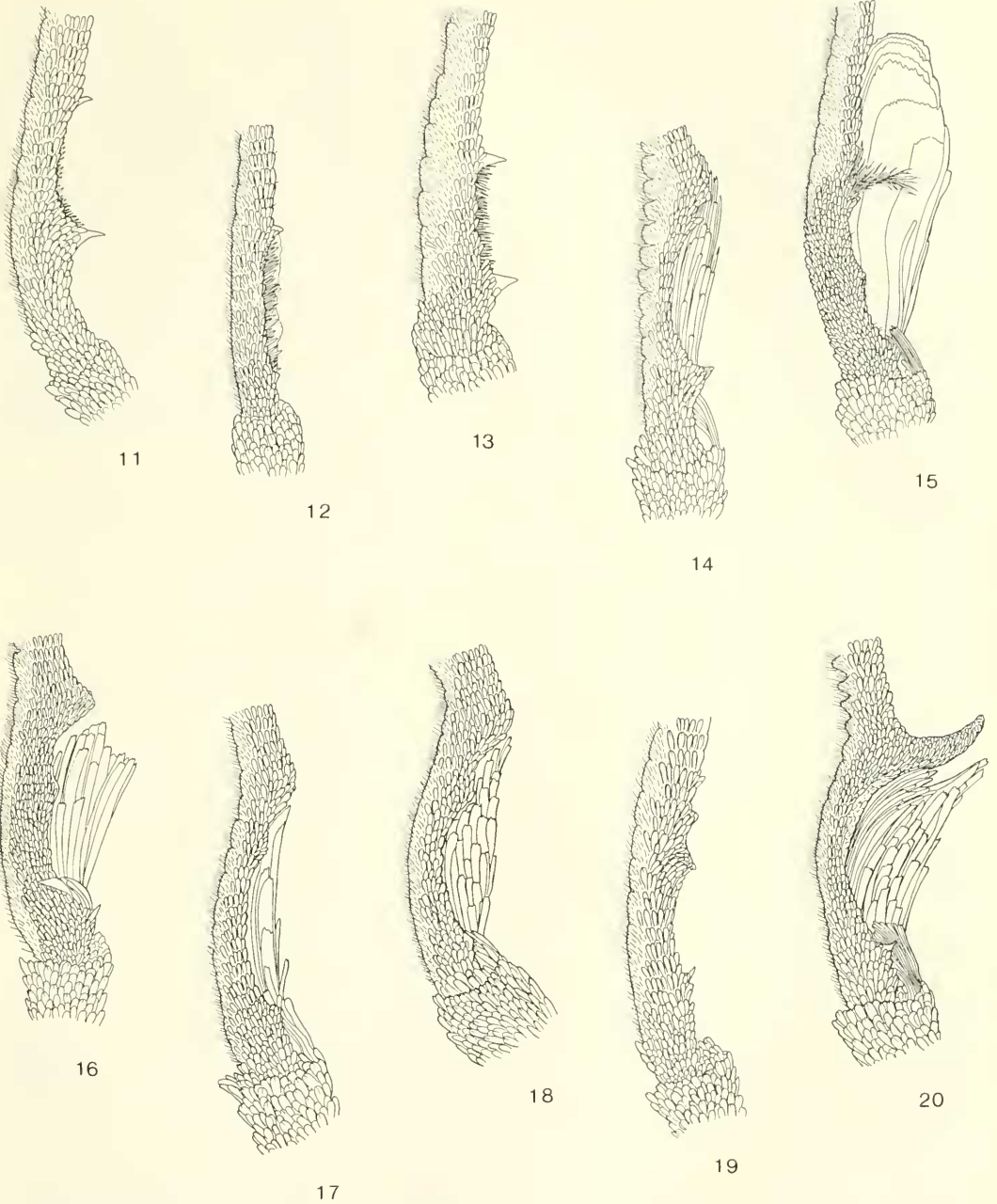
Costa Rican material examined.—Turrialba, Provincia Cartago, 17–21, 22–28 February 1965, S. S. & W. D. Duckworth (1 ♂, 2 ♀); Rio San Lorenzo, Tierras Morenas, 1,050 m., Provincia Guanacaste, September, 1993, G. Rodriguez, INBio

CRI002131584 (1 ♂); Parque Nacional Santa Rosa, Provincia Guanacaste, 12 December 1978–10 January 1979, D. H. Janzen, INBio CRI00204312 (1 ♂).

Other material examined.—Guatemala, Cayuga, May, (no year on label), W. Schaus & W. Barnes (1 ♂, 1 ♀); Panamá, Rio Trinidad, March, May, 1912, A. Busck (1 ♂, 1 ♀; syntypes of *P. mamella* in USNM).

***Ceracanthia pseudopeterseni* Neunzig and Solis, new species**  
(Figs. 2, 13, 23–24, 44)

Diagnosis.—The combination of the following features will separate male *Ceracanthia pseudopeterseni* from other male *Ceracanthia*: forewing length about 11.0 mm. and with its anterior or costal half mostly pale and its posterior half dark (a dark diagonal band at about  $\frac{1}{3}$  out on costa



Figs. 11–20. Male, basal part of right antenna, frontal view. 11, *Ceracanthia mamella*. 12, *C. soraella*. 13, *C. pseudopeterseni*. 14, *C. frustrator*. 15, *C. squamimagna*. 16, *C. squamifera*. 17, *C. schausi*. 18, *C. eugenieae*. 19, *C. alturasiana*. 20, *C. cornuta*.

divides most of the pale costal half into three strongly contrasting, chiefly white patches) and antenna with a sinus whose inner surface is covered with erect papillae (Fig. 13).

Description.—Forewing length 10.0–12.0 mm. Head: frons white; vertex a mixture of black and brownish red scales; labial palpus outwardly mostly white, sprinkled with brownish red scales and with patch of

brown near eye and at distal  $\frac{1}{2}$  of last segment; maxillary palpus simple in both sexes, pale basally, a mixture of black and brownish red distally; antenna of male with basal and distal ends of sinus of shaft only slightly produced mesially (sinus shallow); distal and subbasal end of sinus with distinct spines; inner surface of sinus with erect papillae; short tuft of ochre scales attached to posterior base of sinus (tuft extends about  $\frac{1}{2}$  length of sinus). Forewing of male with long, costal fold and with underside possessing subcostal streak of brownish red scales along most of outer half of wing; wing above mostly white on anterior half and chiefly brown on posterior half; base mostly dark brown to black; a pair of black, diagonally-converging bands extend from costa to fuse with brown of posterior half; bands divide costal half of wing into three contrasting, mostly white patches; middle white patch with small, isolated, elongate, black streak at about mid-costa, and with a single black discal spot; a sprinkling of brownish red scales chiefly on white patches. Hindwing simple in both sexes, pale brown, darker along margins. Male genitalia (Figs. 23–24) with uncus subtriangular, rounded apically; apical process of gnathos a slender, tapered, hooked rod; transtilla absent; juxta a thin plate with short triangularly-shaped, setiferous, lateral lobes; valva broad with distal half evenly rounded along costa, and with broadened, spinelike setae on inner surface; inner basal lobe of valva weakly developed; sacculus with apex distinctly lobed and with large, and small, tuft of very thin scales at base (large tuft slightly longer than length of valva); vesica of aedeagus with group of very small spines and group of slightly larger, more strongly sclerotized spines; vinculum distinctly longer than greatest width, and medially constricted. Female genitalia (Fig. 44) with signum developed as scobinate patch (part of patch sclerotized, teardrop shaped and with pronounced scobinations); ductus bursae shorter than corpus bursae.

Types.—Holotype: ♂. Monte Verde,

Punt. Prov., Costa Rica, 15–16 May, 1980, D. H. Janzen & W. Hallwachs, INBio CRI002044009, genitalia slide 4542 HHN (INBio). Paratypes: same collection data as holotype, except 8–10 Dec. 1978, D. H. Janzen, INBio CRI002044008, genitalia slide 4543 HHN (INBio) (1 ♂); C. R. Puntarenas Pr., Monteverde, 1,400 m., III-29-31-92, UL & MV lights, S. McCarty & J. Powell, genitalia slides 4877, 4878 HHN (UCB) (1 ♂, 1 ♀); Volcan Sta. Maria, Guat., July, (no year on label), Schaus and Barnes Coll. (USNM) (1 ♂); Oconeque, Carbaya, S. E. Peru, 7,000 ft., G. Okenden, genitalia slide 3596 CH (102, 128 USNM) (USNM) (1 ♂).

Etymology.—The name *pseudopeterseni* refers to the misidentification of this species by Heinrich (1956) and subsequently by others as *Megarthritis peterseni* (Zeller).

*Ceracanthia soraella* (Druce),  
**new combination**

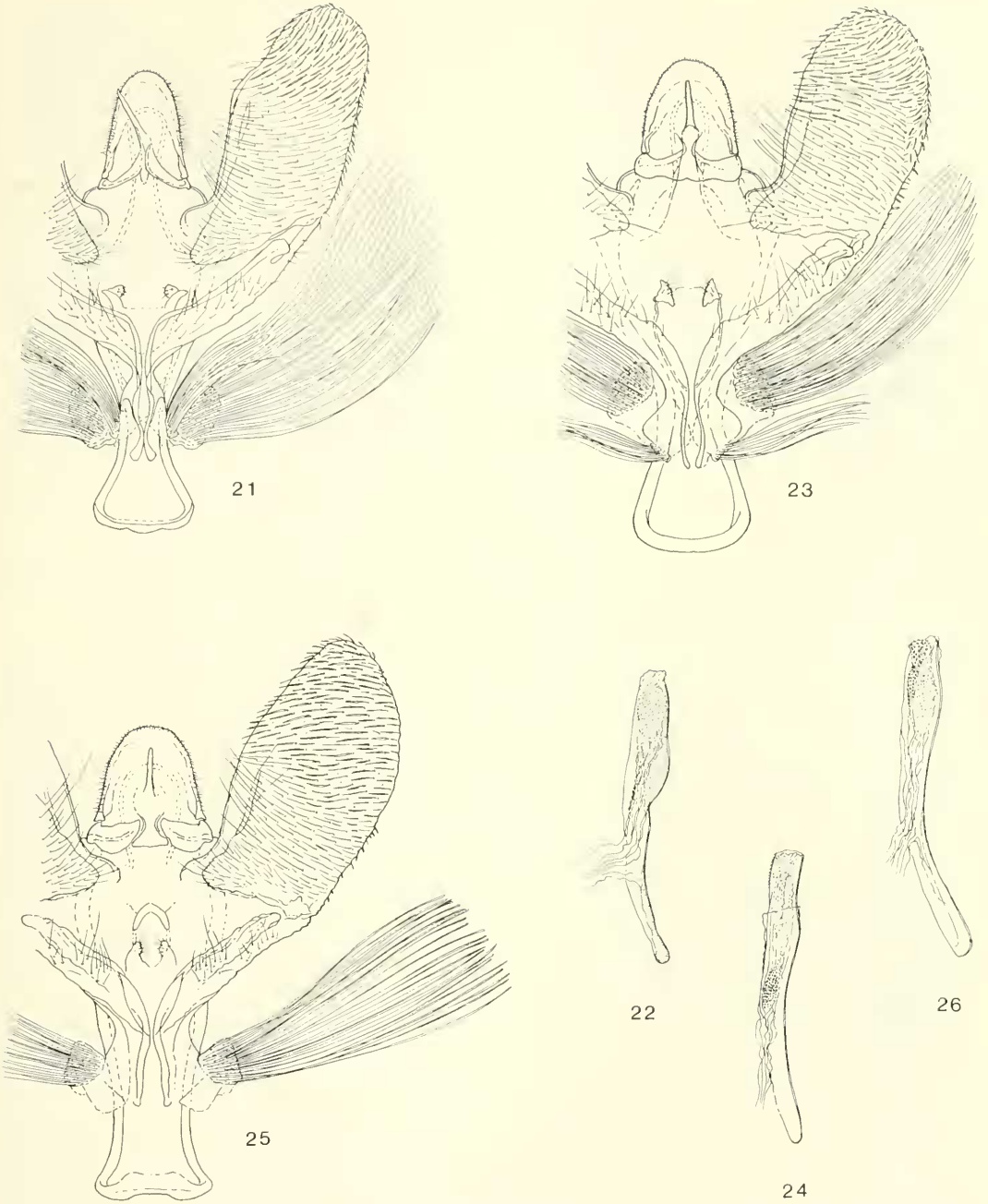
(Figs. 3, 12, 25–26, 41, 45)

*Homoeosoma soraella* Druce 1899:565.  
*Drescoma drucella* Dyar 1914:328.  
*Drescomopsis subelisa* Dyar 1919:62.

Note.—The rationale for transferring *soraella* from *Drescomopsis* to *Ceracanthia* was given following the list of synonyms of the genus *Ceracanthia*.

*Ceracanthia soraella* superficially resembles a small version of *Ceracanthia pseudopeterseni*. The color and maculation of the forewing of both species are similar, and the inner surface of the male antenna of both possess erect papillae. However, *Ceracanthia soraella* has many diagnostic features that separate it from *Ceracanthia pseudopeterseni*, as well as from all other *Ceracanthia*. For example, the male and female of the former has  $M_2$  and  $M_3$  completely fused in the hindwing, and the forewing of the male with a small, flared cluster of scales at the base of costa (Figs. 3, 41), and on the underside, between the discal cell and vein 1A, an elongate pocket enclosing a scale tuft and a mass of modified

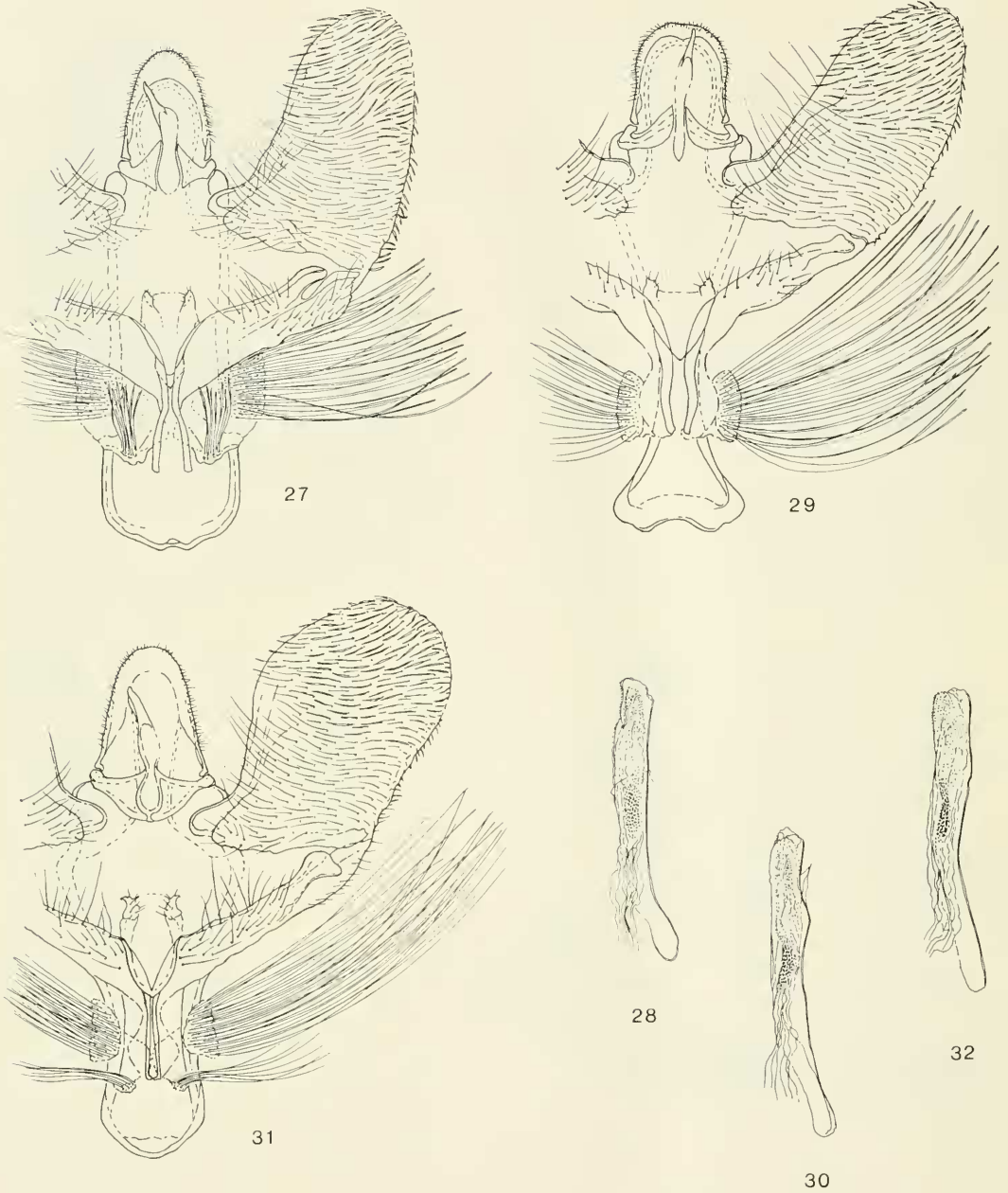




Figs. 21-26. Male genitalia, ventral view. 21, *Ceracanthia mamella* (aedeagus omitted). 22, *C. mamella*, aedeagus. 23, *C. pseudopeterseni* (aedeagus omitted). 24, *C. pseudopeterseni*, aedeagus. 25, *C. soraella* (aedeagus omitted). 26, *C. soraella*, aedeagus.

scales. Other *Ceracanthia* have  $M_2$  and  $M_3$  stalked and have males that lack the small costal cluster and the pocket with its tuft and scales.

The male antenna has a very shallow, easily overlooked, sinus. Heinrich (1956) wrote "shaft of male slightly swollen at base, otherwise simple." However, a close



Figs. 27–32. Male genitalia, ventral view. 27. *Ceracanthia frustrator* (aedeagus omitted). 28. *C. frustrator*, aedeagus. 29. *C. squamimagna* (aedeagus omitted). 30. *C. squamimagna*, aedeagus. 31. *C. squamifera* (aedeagus omitted). 32. *C. squamifera* aedeagus.

look shows a slight depression enclosing a group of papillae, and a small spine at the distal end of the sinus (Fig. 12). Unlike most of its congeners, the sinus of *Cera-*

*canthia soraella* lacks an associated brush or tuft of scales.

The most diagnostic feature of the male genitalia (Fig. 25) is the straplike transtilla

with a pair of anteriorly directed arms. The corpus bursae of the female genitalia has a signum with a teardrop-shaped patch of scobinations (Fig. 45).

Costa Rican material examined.—Juan Viñas, June, November, (no year on label), W. Schaus & W. Barnes (1 ♂); Sitio, June, (no year on label), (1 ♀); Quepos, Parque Nacional Manuel Antonio, 120 m., Provincia Puntarenas, November, 1990, G. Varela & R. Zuniga, INBio CRI000180596 (1 ♂); Cerro Tortuguero, 0–120 m., Parque Nacional Tortuguero, Provincia Limon, March, 1992, May 1991, R. Delgado, INBio CRI000853321, J. Solano, INBio CRI001398889, CR INBio I001398587, INBio I000358990 (4 ♂).

Other material examined.—Mexico, Jalapa, (no date on label), M. Trujillo (3 ♀; syntypes of *H. soraella* in BMNH), Cordoba, May, 1908, F. K. Knab (1 ♀); Belize, San Ignacio, April, 1989, L. C. Dow (1 ♀), Mountain Pine Ridge, May, 1990, L. C. Dow (1 ♂, 1 ♀); Guatemala, Cayuga, April, June (2 ♀; syntypes of *D. subelisa* in USNM); Panamá, Paraíso, May, 1923, R. C. Shannon (1 ♂), Porto Bello, March, October (1 ♂, 1 ♀; syntypes of *D. drucella* in USNM), Rio Trinidad, March, 1912, A. Busck (1 ♀); Ecuador, Zaruma, 1916, F. W. Rohwer (1 ♂); French Guiana, St. Jean de Maroni, no date (1 ♂); Brazil, Isla Sant. Catarina, June, 1935, F. Hoppman (1 ♀), Linhares, January, 1998, V. O. Becker (1 ♂), Cacaúlândia, November, 1991, V. O. Becker (1 ♂), Ibatiguara, March, 1994, V. O. Becker (1 ♂), Amsel (1956, 1957), probably correctly, reported this species from Maracay, Venezuela, but we have been unable to verify his identification.

*Ceracanthia frustrator* (Heinrich),  
**new combination**  
 (Figs. 4, 14, 27–28, 42)

*Megarthritis frustrator* Heinrich 1956:87.

The color and maculation of the forewing of *Ceracanthia frustrator* greatly resembles the appearance of the forewing of most oth-

er *Ceracanthia*. The male of *Ceracanthia frustrator*, however, has a feature not seen on males of other species belonging to the genus (or in the subfamily!): a group of scales protrudes beyond the costa for over ½ the length of the forewing (Figs. 4, 42).

The male antenna (Fig. 14) has a well developed basal sinus with a triangular cluster of scales (possibly enclosing a spine) protruding from its base and a low spine associated with its distal end. The inner surface of the sinus is covered with appressed scales, and a brush of scales is present, attached to the posterior base of the sinus (the brush, composed of narrow scales extends slightly beyond the length of the sinus).

The male genitalia (Figs. 27–28) lack a transtilla, and have a large scale tuft, and a small secondary scale tuft, attached to the base of the sacculus (the large tuft is slightly shorter than the length of the valva). The vinculum is broad and not constricted medially.

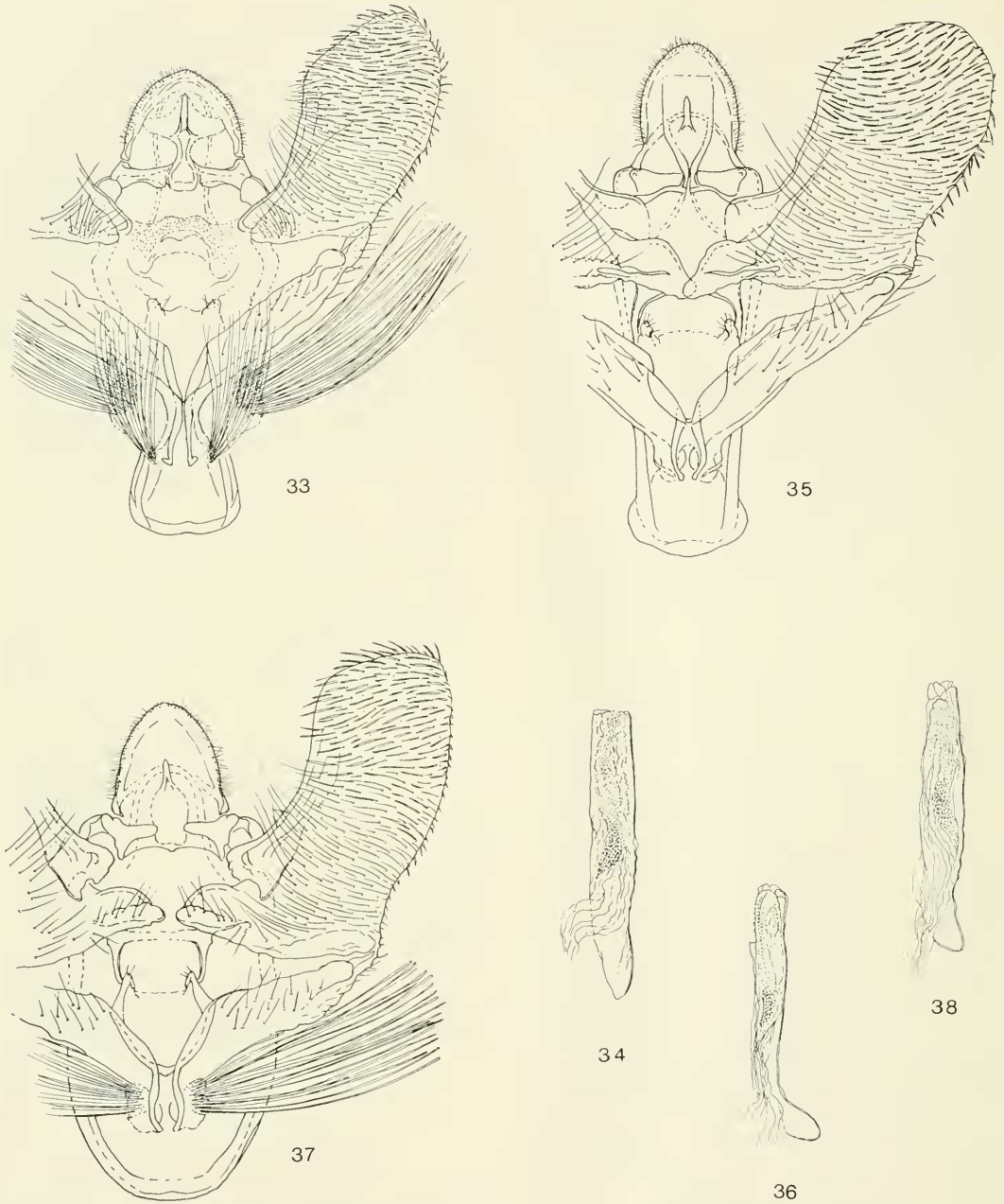
We have not been able to associate with certainty females with males, and, therefore, the appearance of the female genitalia is unknown.

Costa Rican material examined.—Juan Viñas, February, (no year on label), W. Schaus & W. Barnes (1 ♂; holotype of *M. frustrator* in USNM); 8 km. N. Vara Blanca, 1,400 m., Provincia Alejuela, 25 March, 1992, McCarty & Powell (1 ♂, 2 ♀).

*Ceracanthia squamifera* (Heinrich),  
**new combination**  
 (Figs. 5, 16, 31–32, 46)

*Megarthritis squamifera* Heinrich 1956:87.

*Ceracanthia squamifera* is best recognized by examining the antenna of the male (Fig. 16). A strong sinus is present at the base of the shaft, and there is a well developed brush of dark scales attached to the posterior base of the sinus and lying within the sinus. The brush extends almost the entire length of the sinus.

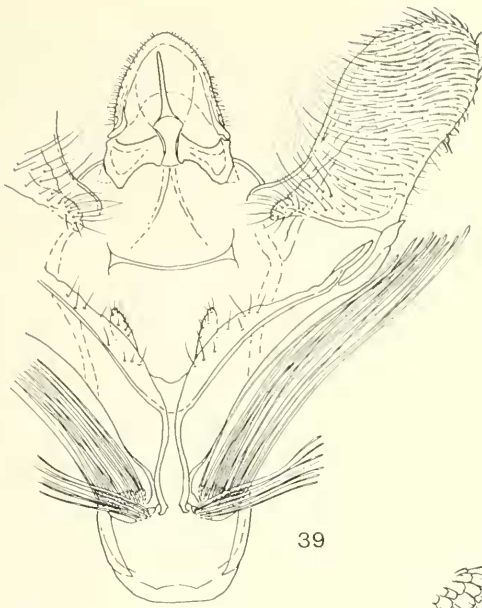


Figs. 33–38. Male genitalia, ventral view. 33, *Ceracanthia cornuta* (aedeagus omitted). 34, *C. cornuta*, aedeagus. 35, *C. eugenieae* (aedeagus omitted). 36, *C. eugenieae*, aedeagus. 37, *C. schausi* (aedeagus omitted). 38, *C. schausi*, aedeagus.

The male genitalia (Fig. 31) have a particularly broad valva with the costa of its distal half noticeably distended. The large brush of the sacculus is longer than the length of the valva. The corpus bursae of

the female genitalia has a signum with a teardrop-shaped patch of scobinations (Fig. 46).

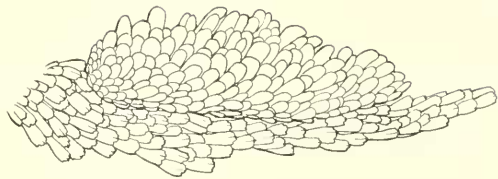
Costa Rican material examined.—Mount Poás, May, (no year on label), W. Schaus



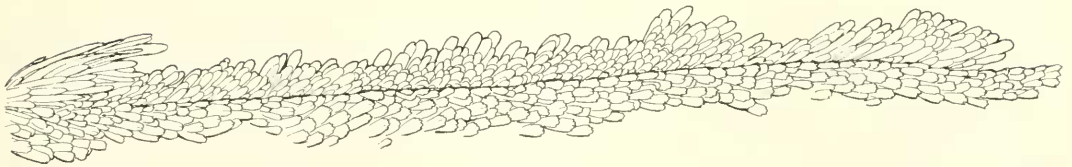
39



40



41



42

Figs. 39–42. Male genitalia, ventral view, and scale cluster or scale ridge on costa of male right wing, dorsal view. 39, *Ceracanthia alturasiana* (aedeagus omitted). 40, *C. alturasiana*, aedeagus. 41, *C. soraella*. 42, *C. frustrator*.

& W. Barnes (1 ♂; holotype of *M. squamifera* in USNM); 9 km. S. Sta. Cecilia, Estacion Pitilla, 700 m., Provincia Guanacaste, July, 1991, 4–18 December, 1991, January 1995, C. Moraga, INBio CRI1000527303, INBio CRI000599235, CR INBio 1002001987, INBio CRI001627819 (4 ♂); Monteverde, Provincia Puntarenas, 10–11 December, 1979, D. H. Janzen, INBio CRI002044007, INBio CRI002044011 (2 ♂).

***Ceracanthia squamimagna* Neunzig and Solis, new species**  
(Figs. 6, 15, 29–30, 47)

Diagnosis.—The male of *Ceracanthia squamimagna* is among the more easily recognized members of the genus. A large, pale tuft of scales is associated with the sinus at the base of the shaft of the antenna (Fig. 15). Some of the scales forming the tuft are very broad (obovate), and the tuft

extends about as far beyond the end of the sinus as the length of the sinus. The distal end of the sinus is also peculiar, in that it is strongly produced and pointed mesially, and is roughly covered with many slender setae.

Description.—Forewing length 7.5–8.0 mm. Head: frons white washed with brownish red; vertex mostly brownish red, suffused with black anteriorly and white posteriorly; labial palpus outwardly white with patches of brownish red; maxillary palpus simple in both sexes, same color as labial palpus; antenna of male (Fig. 15) with well developed sinus at base of shaft; distal end of sinus strongly produced and pointed mesially, and roughly covered with many slender setae; inner surface of sinus with appressed scales; large, pale, scale tuft attached to posterior base of sinus (tuft extends distally about as far beyond end of sinus as length of sinus; some scales forming tuft obovate). Forewing: with concavity in basal  $\frac{1}{2}$  of costa; underside with basal subcostal patch of reddish brown; wing above mostly white on anterior half and chiefly brown on posterior half; base mostly dark brown to black; a pair of diagonally converging black bands extend from costa to fuse with brown of posterior half; bands divide costal half of wing into three contrasting, mostly white patches (most distal patch small, obscure in some specimens); middle white patch with small isolated, elongate, mostly red patch at about midcosta, and with pair of black discal spots; a sprinkling of red to brownish red scales chiefly on white patches. Hindwing: underside with basal, ochre, subcostal patch; wing above pale brown, darker along margins. Male genitalia (Figs. 29–30) with uncus broadly rounded at apex; apical process of gnathos a slender, tapered, slightly hooked rod; transtilla absent; juxta a thin, triangular plate with short, setiferous, lateral lobes; valva broad, with distal  $\frac{1}{2}$  evenly rounded along costa, and with broadened, spinelike setae on inner surface; inner basal lobe of valva moderately well developed;

sacculus with apex distinctly lobed and with large, dark tuft of thin scales at base; no small secondary tuft at base of sacculus; vesica of aedoeagus with group of very small spines and group of slightly larger, more strongly sclerotized spines; vinculum longer than greatest width, and medially constricted. Female genitalia (Fig. 47) with signum developed as scobinate patch (part of patch sclerotized, teardrop-shaped, and with pronounced scobinations); ductus bursae shorter than corpus bursae.

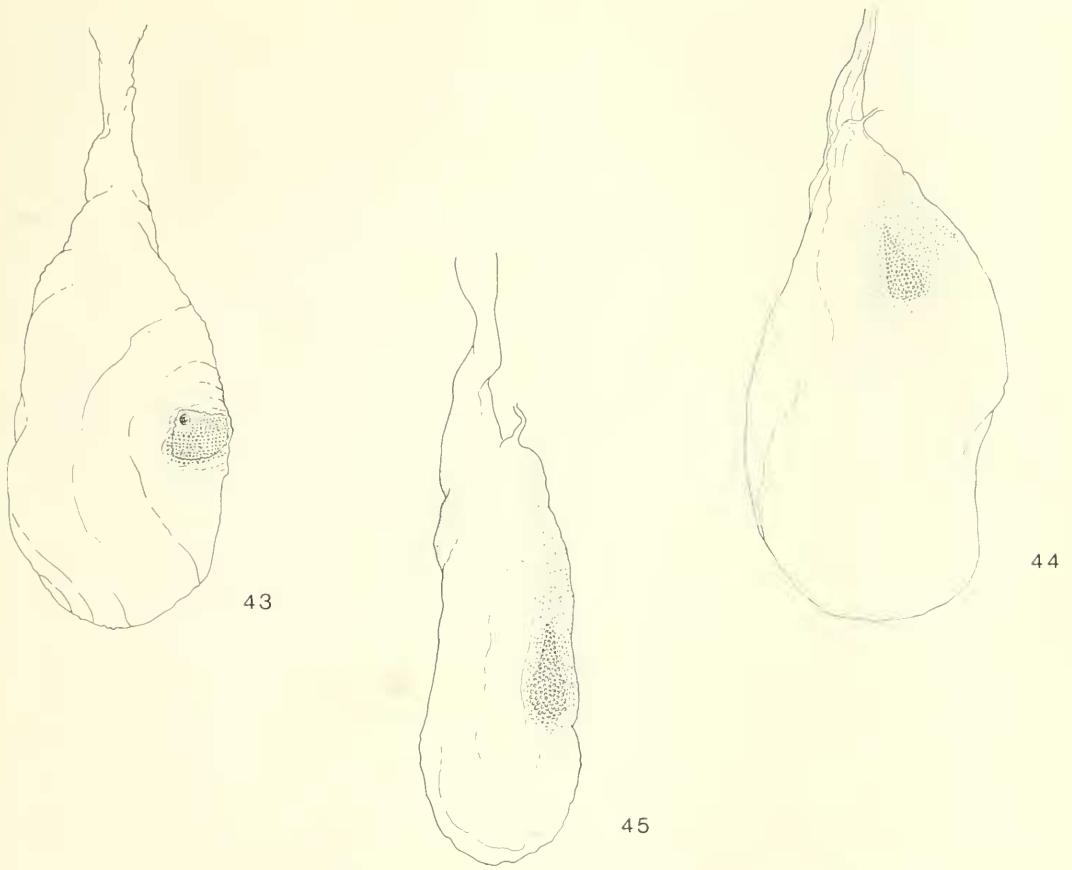
Types.—Holotype: ♂. Quepos, 120 m., P. N. Manuel Antonio, Prov. Punt., Costa Rica, G. Varela & R. Zuniga, Nov. 1990, L-S-370900, 449800, INBio CRI000228018, genitalia slide 4540 HHN (INBio). Paratypes: Cerro Tortuguero, P. N. Tortuguero, 0–100 m., Prov. Limon, Costa Rica, J. Solano, Abr. 1991, L-S-285000, 588000, INBio CRI000444314, INBio CRI000444053, genitalia 444314 MC, 444053 MC (INBio) (1 ♂, 1 ♀); Cerro Tortuguero, 0–120 m., P. N. Tortuguero, Prov. Limon, Costa Rica, Abr., May 1991, J. Solano, L-S-285000, 588000, INBio CRI001375039, INBio CRI001398885, INBio CRI001398904, genitalia slides 4525 HHN, 4526 HHN, 4538 HHN (USNM, NCSU) (1 ♂, 2 ♀).

Etymology.—The name *squamimagna* is a combination of the Latin *squama* (scale) and the Latin *magna* (large) in reference to the large tuft of scales associated with the sinus of the male antenna.

***Ceracanthia cornuta* Neunzig and Solis,  
new species  
(Figs. 7, 20, 33–34)**

Diagnosis.—As with many *Ceracanthia*, the best diagnostic feature of *Ceracanthia cornuta* is found on the male antenna. The distal end of the well developed sinus, at the base of the shaft, is produced mesially into a large, smoothly-scaled, conical, slightly-hooked element (Fig. 20).

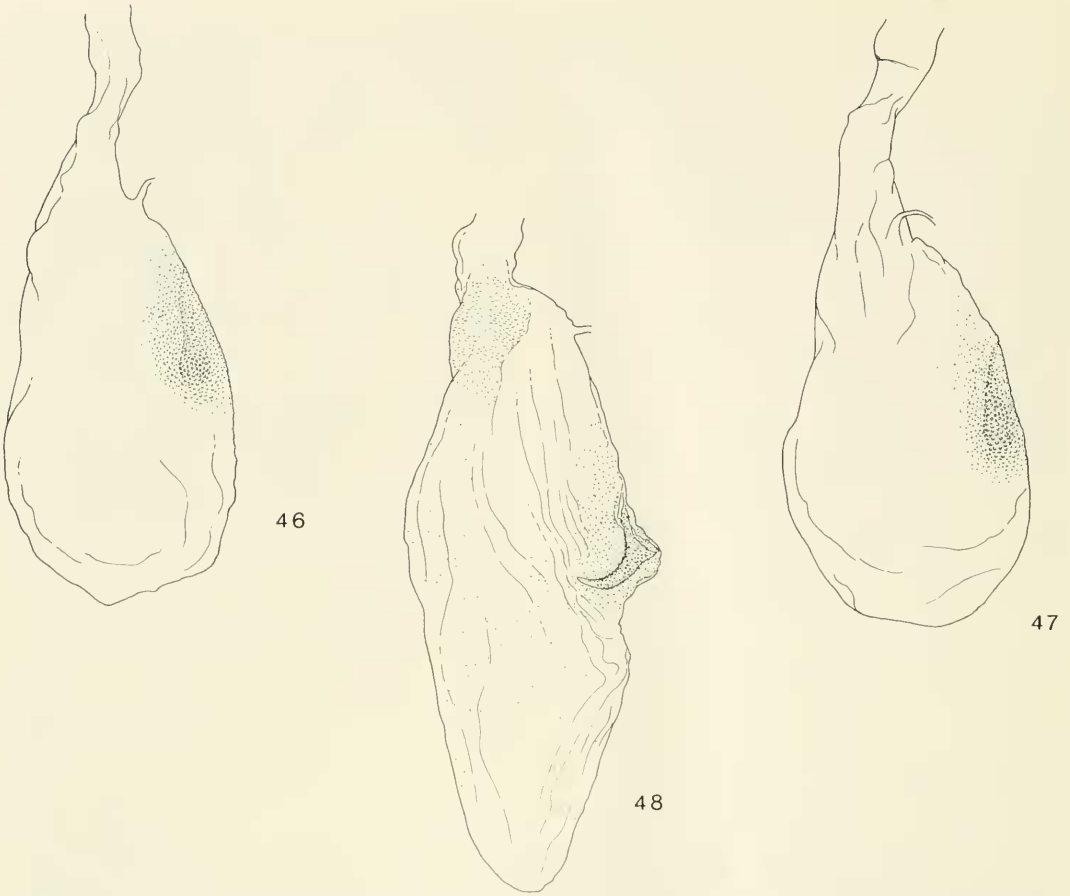
Description.—Forewing length 11.0–11.5 mm. Head: frons ochreous white; ver-



Figs. 43–45. Female genitalia, anterior part, ventral view. 43, *Ceracanthia mamella*. 44, *C. pseudopeterseni*. 45, *C. soraella*.

tex a mixture of pale brown, brown and dark brown scales; pale brown between antennae; labial palpus outwardly with segments mostly white at base and chiefly pale brown and pale reddish brown distally; maxillary palpus simple in male, white and pale brown; antenna of male with sinus in base of shaft, and with basal and distal ends of sinus distinctly produced mesially (distal end enlarged into a conical slightly-hooked process); inner surface of sinus of antenna with appressed scales; brown tuft of scales attached to posterior base of sinus (tuft extends almost to tip of hooked, conical process); part of outer margin of antenna serrate, particularly just above sinus. Forewing of male simple, without costal fold, costal concavity or sex-scaling; wing above most-

ly white on anterior half and mainly brown and black on posterior half; base mostly black; pair of black diagonally converging bands extend from costa to fuse with brown of posterior half; bands divide costal half of wing into three contrasting, mostly white patches; middle white patch with small, isolated, elongate, black and brownish red patch at about mid-costa, and with pair of black and brownish red discal spots; a sprinkling of brownish red scales, chiefly on white patches. Hindwing of male simple, pale brown, darker along margins. Male genitalia (Figs. 33–34) with uncus broad at base; apical process of gnathos a slender, tapered rod; transtilla present, consisting of a transverse, arched, spined band; juxta a thin plate with short, rounded lateral, seti-



Figs. 46–48. Female genitalia, anterior part, ventral view, 46, *Ceracanthia squamifera*, 47, *C. squaminagna*, 48, *C. alturasiana*.

ferous lobes; valva broad, with distal half of costa enlarged; inner basal lobe of valva with low, adjunct, elliptical protuberance; sacculus with apex distinctly lobed, and with large and small, pale tufts of very thin scales at base (large tuft slightly longer than length of valva); vesica of aedoeagus with elongate cluster of microspines, and a second group of slightly larger, more sclerotized spines; vinculum longer than greatest width, with medial constriction. Female unknown.

Types.—Holotype: ♂. Fila Orosilito, Est. Pitilla, 9 km. S. Santa Cecilia, Prov. Guana., Costa Rica, 800–1,000 m., Abr. 1995. C. Moraga, LN 328650, 378600 #4828, INBio CRI002204210 genitalia

slide 4516 HHN (INBio). Paratype: Est. La Casona, 1,520 m., Res. Biol. Monteverde, Prov. Puntarenas, Costa Rica, Jul. 1991, N. Obando, L-N 253250, 449700, INBio CRI000948482, genitalia slide 948482 MC (INBio) (1 ♂).

Etymology.—The large, slightly-hooked, conelike protuberance at the distal end of the sinus of the male antenna is responsible for the specific epithet *cornuta*.

*Ceracanthia schausi* (Heinrich),  
**new combination**  
(Figs. 8, 17, 37–38)

*Megarthritis schausi* Heinrich 1956:87.

Heinrich (1956) separated *Ceracanthia schausi* (as *Megarthritis schausi*) from other



similar species by its unusual transtilla consisting of a sclerotized plate with thin, short arms projecting from its lower (anterior) corners. Our study has discovered another *Ceracanthia* with a similar transtilla (see next species), so a combination of features now needs to be used to identify *Ceracanthia schausi*. In addition to the transtilla, *Ceracanthia schausi* has a broad, rounded vinculum and a strong tuft of scales at the base of the sacculus.

The male antenna (Fig. 17) has a well developed sinus at the base of its shaft. The sinus has a basal spine, and its inner surface is covered with pale, appressed scales. A tuft of mostly dark brown, to black scales, is present, extending the length of the sinus.

We have been unable to associate with certainty females of *Ceracanthia schausi* with males, and, therefore, the appearance of the female genitalia is unknown.

Costa Rican material examined.—Juan Viñas, January, (no year on label), W. Schaus (1 ♂; holotype of *M. schausi* in USNM); 9 km. S. Sta. Cecilia, 700 m., Estacion Pitilla, Provincia Guanacaste, 2–15 May, 1992, C. Moraga, INBio CRI000405603, INBio CRI000599224 (1 ♂, 1 ♀); Estacion La Casona, 1,520 m., Reserva Biologica Monteverde, Provincia Puntarenas, October, 1992, N. Obando, CR INBio I000818108 (1 ♂); Monteverde, 4,400', Provincia Puntarenas, 2 September 1988, C. V. Covell, Jr. (1 ♂).

Other material examined.—Belize, 1,000 Foot Falls, Mountain Pine Ridge, May, 1990, L. C. Dow (1 ♂, 1 ♀), Butler Line, Mountain Pine Ridge, May, 1990, L. C. Dow (1 ♂), San Ignacio, June, 1990, L. C. Dow (1 ♂).

***Ceracanthia eugenieae* Neunzig and Solis, new species**  
(Figs. 9, 18, 35–36)

Diagnosis.—Based on the male genitalia, *Ceracanthia eugenieae* is closely related to *Ceracanthia schausi*. Both have peculiar lobes that protrude inwardly from the base of the valva, and both have a transtilla con-

sisting of a plate with a pair of curved lower (anterior) arms. But, *Ceracanthia eugenieae*, most noticeably, differs from *Ceracanthia schausi*, and all other *Ceracanthia*, in lacking a tuft of scales at the base of the sacculus (Fig. 35).

Description.—Forewing length 8.0–8.5 mm. Head: frons brownish white; vertex reddish brown, dark brown near eye; labial palpus outwardly with basal 2/3 of each segment mostly white, or brownish white, and with distal part white, or brownish white, red, or brownish red, and brown, or black; maxillary palpus simple, white, or brownish white; antenna of male (Fig. 18) with strongly developed sinus; basal and distal ends of sinus without spines (basal end with small, black mound of very short? sensilla); inner surface of sinus covered with appressed setae; tuft or brush of scales attached to posterior base of sinus (tuft or brush extends length of sinus). Forewing of male with long costal fold; underside with subcostal streak (dark with pale center basally becoming brownish red near distal part of costal fold); wing above mostly white on anterior half and chiefly brown on posterior half; base mostly dark reddish brown and black; a pair of black (or dark brown), diagonally-converging bands extend from costa to fuse with brown of posterior half; bands divide costal half into three contrasting, mostly white patches; distal patch small; middle patch with small, isolated, elongate brownish red and black patch at about mid-costa, and with two brownish red and black discal spots; a sprinkling of red or brownish red scales chiefly on white patches. Hindwing simple, pale brown, darker along margins. Male genitalia (Figs. 35–36) with uncus subtriangular, rounded apically; apical process of gnathos a short, slender, tapered, slightly-hooked rod; transtilla a square plate with pair of curved arms extending from its lower (anterior) corners; juxta a thin plate with short, setiferous lateral arms; valva broad with distal half slightly produced inwardly, and with broadened, spinelike setae on in-

ner surface; inner basal lobe of valva strongly developed (as in *Ceracanthia schausi*, but with tips overlapping); vesica of aedoeagus with elongate cluster of microspines and a second cluster of slightly larger, more heavily sclerotized spines; sacculus with apex lobed; base of sacculus without large tuft of setae or scales (also without small secondary tuft present on some *Ceracanthia*); vinculum longer than greatest width, without medial constriction, with base laterally lobed. Female unknown.

Types.—Holotype: ♂. Estación Pitilla, 9 km. S. de Santa Cecilia, Prov. Guana., Costa Rica, 700 m., AGO 1995, C. Moraga, Luz, L-N-329950 380450, #6207, CR IN-Bio I002309873, genitalia slide 4539 HHN (INBio). Paratype: Turrialba, Costa Rica, 600 m., 10.1.1972, V. O. Becker, genitalia slide 4922 HHN (VOB) (1 ♂).

Etymology.—We are pleased to name this species in honor of Eugenie Phillips-Rodríguez at INBio. Her enthusiasm in providing specimens, and assisting in many other ways, greatly added to the success of our study.

*Ceracanthia alturasiana* Neunzig and Solis, new species

(Figs. 10, 19, 39–40, 48)

Diagnosis.—Like *Ceracanthia mamella*, the forewing of *Ceracanthia alturasiana* does not resemble the forewings of other species in the genus. However, the latter species cannot be confused with the former because the color and maculation of the forewings of the two species are very different. An obvious feature is a strong post-medial line on the wing of *Ceracanthia alturasiana* (Fig. 10); this distinct line is absent from *Ceracanthia mamella*, as well as from all other Costa Rican *Ceracanthia*.

Description.—Forewing length 8.0–8.5 mm. Head: frons ochre; vertex pale reddish ochre; labial palpus outwardly with basal segment white and pale ochre, other two segments ochre with brown distally; maxillary palpus simple in both sexes, ochre; antenna of male with basal sinus with small

spine at basal end of sinus and small spine at distal end of sinus (two additional spines beyond distal end of sinus); inner surface of sinus with appressed scales; small, short weakly-formed tuft of scales attached to base of sinus (tuft extends about ½ length of sinus). Forewing: simple, without costal concavity, costal fold, or other modifications or embellishments; wing above basally and subbasally dark brown to black, sprinkled with brownish red, and with dusting of ochre, particularly along costa; antemedial line fragmented, bur rather distinct, ochre; postmedial line well developed, white and ochre; medial area with ground color dark brown to black, with dusting of brownish red scales, and with distinct patch of ochre surrounding discal spots; discal spots dark brown to black and brownish red. Hindwing simple in both sexes, mostly pale brown, darker along margins. Male genitalia (Figs. 39–40): with uncus subtriangular, rounded apically; apical process of gnathos a slender, long, slightly-tapered, hooked rod; transtilla present, represented by a thin, sclerotized, medial band; juxta a thin plate with short, setiferous, lateral lobes; valva broad with distal half slightly produced along costa, and with broadened, spinelike setae on inner surface; inner basal lobe of valva weakly developed; sacculus with apex narrowly lobed, and with yellowish, basal tuft of thin scales (tuft slightly longer than length of valva); vesica of aedoeagus with cluster of microspines and a well developed group of medium-sized spines; vinculum longer than greatest width, and not medially constricted. Female genitalia (Fig. 48) with ductus bursae shorter than corpus bursae; corpus bursae with patch of many, small spines posteriorly that extends a short distance into ductus bursae, and with a more anterior sclerotized, scobinate patch on its right side (when viewed ventrally) bearing an imbricate, hooked spine that extends mostly laterally; ductus seminalis attached to corpus bursae near junction of ductus bursae and corpus bursae.

Types.—Holotype: ♂. C. R.: Estac. Biol. Las Alturas, 1,550 m., 12 air km. NE San Vito, Punt. Prov., 1-22/24-1993, J. Powell, at blacklight, genitalia slide 4857 HHN (UCB). Paratypes: same collection data as holotype, genitalia slide 4858 HHN (UCB, NCSU) (3 ♀); C. R.: Puntarenas Pr., Monteverde, 1,400 m., 111-30-1992, Powell (UCB) (1 ♀).

Etymology.—The specific epithet is derived from the type locality (Las Alturas), and the Latin suffix *-ana* (meaning “belonging to”).

#### ACKNOWLEDGMENTS

We thank the many parataxonomists at INBio for collecting, spreading and labeling most of the specimens we studied. Also, at the same institution, Mario Comacho prepared slides of genitalia, and Eugenie Phillips arranged for the loan of material. Other study specimens were provided by Jerry A. Powell, UCB, and Vitor O. Becker, Brasilia, Brazil. Robert L. Blinn, NCSU, made the habitus photographs.

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